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NPIC/TSSG/RED-075-70
2 March 1970

MEMORANDUM FOR: Executive Officer, Technical Services & Support Group
SUBJECT : Additional Personnel Required by RED during FY-71

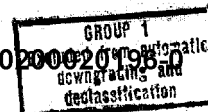
1. The following two billets are urgently required by RED in order to continue to carry out our responsibilities to the Center. The billets are listed in the order of priority.

a. A GS-13/14 Psychologist/Experimental Design Specialist-- An additional PHD/psychologist/psychophysicist is urgently needed to provide further depth to the Human Factors Section of the Advanced Technology Branch. The section currently consists of [redacted] serves as Chief of the Section and carries extensive scientific advisory, supervisory, and in-house experimentation responsibilities. [redacted] is assigned almost full time to managing contractual efforts in the Human Factors and Imagery Interpretation Research areas.

Because of [redacted] supervisory and advisory responsibilities, in-house experimentation has had to be relegated to second priority despite its promise of high payoff. The additional psychologist would be devoted half time to in-house experimentation, with primary emphasis upon establishing interpreter performance measures.

The remaining half of the additional psychologist's time would be spent in the critical area of experimental design, supporting all NPIC components conducting in-house and contractual study projects. Considerable amounts of time, manpower, and materials, and hence money, are currently expended within NPIC on a wide variety of experimental tasks requiring the design discipline. (See attached compilation of current and planned research topics.) However, the value of the results obtained from such tasks is dependent, in very large measure, not only upon the technical competence of the individuals responsible for the research, but also upon their ability to design the most effective experiment and to employ the most powerful, revealing statistical analysis applicable in the operational setting. A psychologist specializing in experimental design and

SECRET



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analysis would contribute an ability to translate operational requirements into meaningful research, an ability not typically available from NPIC contractors. He would thus significantly aid the Center in its planning of relevant, credible and potent experimental studies to help solve pressing operational problems. One example of how such services proved to be important in the past had to do with the Center's vision testing program. Due to some inadequacies in the original experimental design preliminary results indicated a marked decrease in visual sensitivities overtime. A revised set of experimental procedures indicated that this was not in fact the case, but that they were the result of the nature of the design itself.

The position requires a behavioral scientist thoroughly familiar with experimental design, statistical analyses and psychophysical techniques. A background in visual perception, human factors, or physical, geometric or physiological optics would be most beneficial, but not mandatory.

The specific requirements levied upon this individual would fall into two major categories: a) providing expert guidance and assistance to a variety of RED, Center and contractual researchers in matters pertaining to experimental design, and statistical analyses, and conclusions drawn therefrom; b) in-house research, with particular emphasis placed upon the design and conduct of research in the area of performance measures, especially as they relate to evaluations of new or modified imaging systems or photointerpretation exploitation hardware.

The candidate must be knowledgeable in the following substantive areas: parametric, enumeration and non-parametric statistics; probability theory; statistical inference; sampling techniques; regression analyses, including part, partial and multiple correlation techniques; factor analyses; single and multiple analysis of variance and covariance; psychophysical theory scaling and test development, and information theory.

Two potential candidates for the described position are currently being considered by RED.

b. A GS-13/14 electro-optical engineer--An electro-optical engineer is urgently required to be utilized by both the Systems Research and Systems Development Branches. Modern display systems, viewing systems, mensuration and optical photographic printing equipments have become more and more sophisticated and highly automated. They have increasingly become electro-optical rather than pure optical devices. Data block readers, digital image manipulation

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equipment, cathode ray tube printing equipment, automatic target indexing devices, and change detection instruments have now become so complicated that being an expert in optics, or an expert in electronics is not sufficient. The interfacing of these two technologies is in itself an art which is acquired only through extensive training and experience. This is why a high grade is required. The position demands an individual with considerable industrial design experience as well as appropriate academic background. This individual would, of course, be extremely important to our development effort in the event of any large impact from EOI, but is still essential to fulfill RED's mission even if NPIC never becomes involved in that program.

[redacted]
Chief, Research & Engineering Division, TSSG

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Attachment

Distribution:

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1 - NPIC/TSSG/RED

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In his role as designer, he will be intimately involved in formulating the structure of the research and analyses of the following concepts, equipments or materials:

1. Equipment Development Support

- a. Electro-optical Imagery Displays
- b. Microscope Design Criteria
- c. Scan/Search PI Station
- d. Coherent Rear Screen Projector
- e. High Precision Stereo Comparator
- f. Automatic Stereo Comparator
- g. Narrow Band Light Table
- h. Colorimeter

2. Unconventional Imagery Evaluation

- a. PI Acceptance of Unconventional Materials
- b. Photographic Image Quality Determination
- c. Digital Image Manipulation
- d. Optical Image Manipulation
- e. Photographic Image Manipulation
- f. Chemical Image Manipulation
- g. Intelligence Value of Color
- h. Color Vocabulary
- i. Color Processing Variations
- j. Color Reflectance Characteristics
- k. Color Vision Testing

3. Color Image Quality

- m. Power Spectral Density as an Image Quality Measure
- n. Photo/Optical System Noise Reduction
- o. Film Content vs Information Content

3. Mensuration

- a. Reticle Design
- b. Height Mensuration Techniques
- c. Stereo Acuity Test Development
- d. Accuracy Determination (Color, Line Scan, Displays, Magnification, Illumination)

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4. PI Process Research

- a. Attitude Survey
- b. Motivation Test Development
- c. Aptitude/Achievement Test Correlation
- d. Training Techniques Development
- e. Visual Process Research